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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/549,494	09/15/2005	Takatomo Sasaki	10873.1761USWO	7729

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HAMRE, SCHUMANN, MUELLER & LARSON, P.C.
P.O. BOX 2902
MINNEAPOLIS, MN 55402-0902

EXAMINER	
SONG, MATTHEW J	

ART UNIT	PAPER NUMBER
1792	

MAIL DATE	DELIVERY MODE
02/25/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/549,494	SASAKI ET AL.	
	Examiner	Art Unit	
	MATTHEW J. SONG	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 December 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-12,14,17,18,20,21,24-28,30,37,39 and 41* is/are pending in the application.

4a) Of the above claim(s) *37,39 and 41* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-12,14,17,18,20,21,24-28 and 30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election of Group I, claims 1-31 and 35 in the reply filed on 12/4/2007 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)). It is noted that applicant merely alleges "traversing the rejection to the extent of requesting reinstatement," however no errors in the restriction requirement are identified.

2. Claims 37-42 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 12/4/2007.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 14 recites the limitation "the ratio of calcium" and "the ratio of lithium" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim. Claim 1 does recites Ca or Li.

5. Claim 28 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 28 recites, "substituted by the nitrogen-containing gas gradually" in line 2. It is unclear what "gradually" is intended to define. In other words, there is no clearly defined rate for "gradually".

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1, 3-7, 9-12, 17, 18, 20 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamura et al ("Growth of a Large GaN single Crystal using the liquid

phase epitaxy (LPE) Technique") in view of Kojima et al (JP 01-242483), an English Abstract is provided.

Kawamura et al teaches a method of LPE comprising heating a reaction vessel (crucible) containing Na (an alkali metal) and gallium (Ga) to 800°C. (pg L4). Kawamura et al also teaches feeding a nitrogen containing gas (nitrogen and ammonia) and thereby allowing the Ga and nitrogen to react with each other to grow Group III nitride single crystals. (pg L4 and Abstract).

Kawamura et al does not teach the flux of the metal element and the Group III element are stirred to be mixed together by rocking the reaction vessel.

In a method of Liquid Phase Epitaxy, Kojima et al teaches inclining and oscillating a vessel to stir a melt before bringing the melt into contact with a substrate (Abstract), this clearly suggests rocking the vessel. Kojima et al also teaches stirring the melt to stabilizing and improve the composition ratio, i.e. improve uniformity, over the entire surface of a grown crystal film. (Abstract).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Kawamura et al's LPE process by rocking the vessel, as taught by Kojima et al, to stir the melt, thereby improving uniformity of the melt.

Referring to claim 3, the combination of Kawamura et al and Kojima et al teaches the vessel is oscillated around the axis orthogonal with said direction. ('483 Abstract), this clearly suggests rotating.

Referring to claim 4, the combination of Kawamura et al and Kojima et al teaches a thin film formed by MOCVD and growth on the film. (Kawamura pg L4).

Referring to claim 5, the combination of Kawamura et al and Kojima et al teaches growing continuously. (Kawamura pg L4).

Referring to claim 6-7, the combination of Kawamura et al and Kojima et al teaches tilting to start and end the process. ('483 Abstract).

Referring to claims 9-12, the combination of Kawamura et al and Kojima et al teaches Ga metal to form GaN using a Na flux. (Kawamura pg L4).

Referring to claim 17, the combination of Kawamura et al and Kojima et al teaches a temperature of 800°C and a pressure of 5 atm (0.5 MPa) (Kawamura pg L4).

Referring to claim 18, the combination of Kawamura et al and Kojima et al teaches nitrogen and ammonia. (Kawamura pg L4).

Referring to claim 20, the combination of Kawamura et al and Kojima et al teaches single crystals of GaN. (Kawamura pg L4).

Referring to claim 26, the combination of Kawamura et al and Kojima et al teaches transparent GaN. (Kawamura pg L5).

8. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamura et al ("Growth of a Large GaN single Crystal using the liquid phase epitaxy (LPE) Technique") in view of Kojima et al (JP 01-242483), an English Abstract is provided, as applied to claims 1, 3-7, 9-12, 17, 18, 20 and 26 above, and further in view of D'Evelyn et al (US 6,398,867).

The combination of Kawamura et al and Kojima et al teaches all of the limitations of claim 8, as discussed previously, except mixing by heating a lower part to generate heat convection.

In a method of growing GaN, note entire reference, D'Evelyn et al teaches dissolving Ga in a solvent and heating to generate convention which stirs the reaction so as to result in enhanced GaN growth rate, uniformity and homogeneity. (col 7, ln 1-67).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Kawamura et al and Kojima et al to generate convection, as taught D'Evelyn et al, to improve growth rate, uniformity and homogeneity.

9. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamura et al ("Growth of a Large GaN single Crystal using the liquid phase epitaxy (LPE) Technique") in view of Kojima et al (JP 01-242483), an English Abstract is provided, as applied to claims 1, 3-7, 9-12, 17, 18, 20 and 26 above, and further in view of Kawamura et al ("Synthesis of Bulk GaN single crystals using Na-Ca flux").

The combination of Kawamura et al and Kojima et al teaches all of the limitations of claim 14, as discussed previously, except the ratio of Ca to the sum of Na and Ca is in the range of 0.1 mol% to 99 mol%.

In a method of making GaN using a Na-Ca flux, note entire reference, Kawamura et al teaches Ca increases the yield of GaN crystal and transparent GaN single crystals are easier to grow. (Abstract). Kawamura et al also teaches a variety of concentrations of Na and Ca which are within the claimed range of 0.1-99 mol%. (Table 1 and pg L1440-1441).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Kawamura et al and Kojima et al by adding Ca, as taught by Kawamura et al, to increase yield and making growing transparent crystals easier.

10. Claim 21, and 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamura et al ("Growth of a Large GaN single Crystal using the liquid phase epitaxy (LPE) Technique") in view of Kojima et al (JP 01-242483), an English Abstract is provided, as applied to claims 1, 3-7, 9-12, 17, 18, 20 and 26 above, and further in view of Shibata et al (US 6,270,569).

The combination of Kawamura et al and Kojima et al teaches all of the limitations of claim 14, as discussed previously, except using impurities.

In a method of growing GaN from a melt, note entire reference, Shibata et al teaches Mg was added to a Ga melt to thereby grow a Mg doped GaN. (col 9, ln 15 to col 10, ln 55 and col 5, ln 40-60).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Kawamura et al and Kojima et al by doping with Mg, as taught by Shibata et al, to produce a p-type GaN having desirable electrical characteristics.

Referring to claim 25, the combination of Kawamura et al, Kojima et al and Shibata et al teaches Mg.

Referring to claim 21, the combination of Kawamura et al, Kojima et al and Shibata et al teaches a substrate having a dimension of 25 mm (2.5 cm). ('569 col 13, ln 35-65).

11. Claim 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamura et al ("Growth of a Large GaN single Crystal using the liquid phase epitaxy (LPE) Technique")

in view of Kojima et al (JP 01-242483), an English Abstract is provided, as applied to claims 1, 3-7, 9-12, 17, 18, 20 and 26 above, and further in view of Hawrylo et al (US 3,811,963).

The combination of Kawamura et al and Kojima et al teaches all of the limitations of claim 27, as discussed previously, except the stirring is carried out in an atmosphere of inert gas and then nitrogen containing gas is substituted.

In a method of GaN growth from the liquid phase, note entire reference, Hawrylo et al teaches a melt is formed which include gallium and materials of the melt are heated in an inert gas of hydrogen, and when the melt is completely molten, the flow of inert gas is stop and nitrogen is passed through the furnace. (col 2, ln 1-70).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Kawamura et al and Kojima et al by melting in an inert gas atmosphere and then substituting to a nitrogen containing gas atmosphere, as taught by Hawrylo et al to prevent premature reaction of the melt before the mixture is uniform.

The combination of Kawamura et al, Kojima et al and Hawrylo et al teaches stirring by rocking prior to reaction and prior to reacting, heating under an inert gas atmosphere, then substituting with nitrogen containing to cause reaction.

Referring to claim 28, gradually is indefinite. The combination of Kawamura et al, Kojima et al and Hawrylo et al teaches substituting the gases, thus "gradually" is interpreted by the examiner such that flowing the nitrogen gas through the furnace after stopping the inert gas flow suggests gradually.

12. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamura et al ("Growth of a Large GaN single Crystal using the liquid phase epitaxy (LPE) Technique") in view of Kojima et al (JP 01-242483), an English Abstract is provided, as applied to claims 1, 3-7, 9-12, 17, 18, 20 and 26 above, and further in view of JP 75011870 B ('870), an English Abstract is provided.

The combination of Kawamura et al and Kojima et al teaches all of the limitations of claim 30, as discussed previously, except mixing using a stirring blade.

In a method of making a Group III-V crystal using liquid phase epitaxy, '870 teaches a molten solution is stirred with a carbon stirrer to absorb oxygen in the solution and this produces crystal with a higher purity. (Abstract). '870 also teaches rotating the stirrer. (Fig 1).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Kawamura et al and Kojima et al by stirring using as stirrer, as taught by '870, to removing an oxygen impurity and produce a uniform melt.

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. SONG whose telephone number is (571)272-1468. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on 571-272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew J Song
Examiner
Art Unit 1792

MJS
February 19, 2008

/Robert M Kunemund/
Primary Examiner, Art Unit 1792